INTERNATIONAL MARITIME ORGANIZATION

IMO

E

MARINE ENVIRONMENT PROTECTION COMMITTEE
49th session
Agenda item 2

MEPC 49/INF.31
23 May 2003
ENGLISH ONLY

HARMFUL AQUATIC ORGANISMS IN BALLAST WATER

Summary of an International Workshop on Ballast Water Discharge Standards

Submitted by the United States

SUMMARY	
Executive summary:	This document presents the outcome of a workshop held in the United States to discuss ballast water treatment standards
Action to be taken:	Paragraph 18
Related documents:	MEPC-IBWWG 2/2/11

Background

1 The United States Department of State and the United States Coast Guard, in cooperation with the National Science Foundation (NSF), co-sponsored a Workshop, held from 12 to 14 February 2003, at NSF headquarters in Arlington, Virginia, United States. The Workshop objective was to evaluate options for a treatment standard, and recommend a standard that was environmentally protective, and practical for the shipping industry. The principle questions presented to the panel for discussion were:

.1 whether ballast water discharge standards should be phrased in terms of percent removal or allowable concentration of organisms;

.2 whether both an initial and longer-term standard are necessary, or whether a single longer-term standard could serve;

.3 whether a size criterion would be useful in framing the standard, and if so, what size or sizes would be most appropriate;

.4 what quantitative level of treatment would be most appropriate for initial and/or longer term standards;

.5 what technologies were currently available or would become available soon;

.6 what time line might be appropriate for implementation of initial and/or longer-term standards; and

.7 any other issues the panel considered important in developing standards to reduce and eventually prevent the introduction of non-indigenous aquatic organisms via the discharge of ships' ballast water.

2 Technical experts from the following Member States participated in the Workshop: Brazil, Canada, Germany, New Zealand, Singapore, United Kingdom, and United States. Representatives of the IMO also attended the Workshop.

3 Participants in the Workshop had technical expertise in the following disciplines: biota of ballast water, marine biology, treatment of ballast water to remove or kill organisms, wastewater and drinking water treatment, naval architecture and marine engineering, environmental engineering.

Method of work

4 Participants met for three days at the headquarters of the United States National Science Foundation. Introductory presentations on the state of development of ballast water treatment technologies were made by participants with experience in such efforts, followed by general discussion of the information provided.

5 Participants also discussed, within the general group, the issue of whether microorganisms (viruses, bacteria, and protists) should be addressed by ballast water treatment standards.

6 Within smaller working groups, each composed of participants with an array of technical backgrounds and experiences, the participants discussed the questions identified in paragraph 1 above, and developed recommendations on each.

7 The work group recommendations were discussed within the entire group, and a set of revised recommendations was developed integrating the work group and plenary discussions.

Results

8 The small working groups independently agreed to a number of fundamental principles regarding ballast water discharge standards and proposed some possible options for such a standard. The outcomes and recommendations of the Workshop are summarized in an annex hereto.

9 Plenary discussion of options:

.1 All groups agreed that the standard should be framed as an allowable concentration, rather than a required percent reduction. The latter would be difficult to enforce or to verify upon discharge, without specific knowledge of initial concentrations. Further, percent reduction requirements produce varying actual discharge concentrations, which are not based on either biological (level of protection required to greatly reduce/prevent invasions) or technical (detection limits) grounds.

.2 The use of size criteria was recognized as providing a balance between protection and practicability.

.3 Groups 2 and 3 wanted to see the initial size criterion set at 50 μm, as recommended by Group 1, but thought 100 μm would be more widely achievable. This group expressed concern over the inability to evaluate treatment system capabilities. It was agreed during the general discussions that 50 μm would be more biologically protective, but that there was little information available upon which to base a decision between the two with respect to the availability of technology to achieve either level of treatment. While all of the technologists present held the opinion that 100 μm could be achieved soon, some also thought that 50 μm would also be widely practicable in the near-term.

.4 Group 2 expressed the standard as specific concentrations, based on a preliminary consideration of existing densities of plankton in ballast water (BW) and detection limits using molecular probes. Some concentrations were suggested for discussion, and the importance of considering detection limits was emphasized.

.5 Group 2 suggested addressing microbial organisms by focusing on taxa of concern, such as specific pathogens of humans and commercially important species. Ideally, the allowable concentrations for these would be set below the minimum inocula required for infection.

10 Following comparison and discussion of the workgroup recommendations, a synthesis was suggested, as follows:

	Standard	Suggested Date
Initial	For organisms > 50 μm: No detectable viable organisms or < 1 org./MT	[2006]
Later	For organisms > 10 μm: No detectable viable organisms, or < 1 org./100 MT For organisms < 10 μm: less than a specified concentration for each specified target taxa	[2015]

11 Final dates and concentrations remain to be determined, and both initial and later standards would need to be reviewed prior to coming into effect to ascertain the availability of technology. For either "no detectable" or "specified concentration" expressions, standard methods for sampling and analyses will need to be developed and validated.

12 The following additional important points were made during the discussions:

.1 Standards should be set to challenge the development of treatment technologies.

.2 Standards should be revised over time. Towards this end, it could be useful to identify both an initial standard, and at least one additional standard to serve as a longer-term target for technology developers. In any event, the existing standard should be periodically reviewed and revised as appropriate to reflect advances in the relevant technologies.

.3 There is a need to avoid the "law of unintended consequences" – i.e., if standards are phased in by ballast capacities, and a cut-off for an initial requirement to meet the standard is set at 100,000 MT, then it is likely that ships will be built at 100,100 MT.

.4 There is a need to treat market sectors equitably.

.5 Experience following passage of the United States Clean Water Act showed that an absolute standard of "zero discharge" was an unrealistic/unworkable concept – detection limits have always been a problem.

.6 Setting a specific detection limit means that an actual concentration will be allowed for the testing protocol, therefore it might be better to specify the (acceptable) concentration as determined by the selected test protocols, rather than to use the expression "zero detectable" in the standard. This concept could be specified in the testing protocol guidelines.

13 Many of the participants had direct experience with testing available treatment technologies. The discussion resulted in the following comments:

.1 Heat and oxidizing treatment technologies appear to be promising, in small-scale tests.

.2 Screen and media filters look promising for larger sized organisms (certainly for those > 100 μm, and probably for those > 50 μm). Media filters are more promising than screens, as screen systems may need considerable modifications before being used in BWT to address problems with clogging, manufacturing irregularities, etc.

.3 UV is an option for serious consideration for organisms < 10 μm, but this treatment may be less effective with some larger organisms. However, larger organisms not killed immediately may exhibit delayed mortality. It may be problematic to "scale up" UV treatments, as neither hydrodynamics nor radiation fields change linearly with size. There is also a need to investigate the production of disinfection byproducts when organic-rich marine and estuarine water is treated with UV, due to the potential for photocatalysis of pollutants.

.4 Chemical treatment options were only briefly discussed. Some expressed concern over potential environmental effects while others felt that chemical treatment, when shown to be environmentally sound, should not be ruled out as a treatment option, especially for the pathogens of concern.

Identified needs

14 Participants felt that there was a need for a future focused Workshop on type testing protocols, particularly regarding standardized detection, enumeration, and viability analyses. These methods are still to be determined, and in many cases the constraints of sampling ballast water to detect very small concentrations of organisms in very large amounts of water dictate that new methodologies be developed.

15 Review of available technology will be necessary prior to an initial standard going into effect for any specific ship type.

16 Participants agreed that shipboard testing was needed to verify that technologies were reliable. However, some expressed concern over the high cost and challenging logistics of such tests.

Summary of recommendations

17 The Workshop participants recommended the following:

.1 Ballast water discharge standards should be expressed as allowable concentrations of organisms.

.2 Ballast water discharge standards should be set to challenge the development of technology.

.3 Ballast water discharge standards should be revised over time to reflect advances in the technologies underlying treatment and the detection and enumeration of organisms in ballast water.

.4 At a minimum, the initial standard should be set as an allowable concentration of organisms larger than a specified size criterion, probably either 50 μm or 100 μm, depending on the expected capabilities of technology.

.5 The allowable concentration of organisms larger than the size criterion should be set at a limit of detection determined by the specific sampling and enumeration methods chosen.

.6 A focused technical group should be established to guide development of and review standard methods for use in type testing and available treatment technologies.

Action requested of the Committee

18 The Committee is invited to note the information provided in this document, with a view towards refining the text related to discharge standards in the draft Convention.

***

ANNEX

OUTCOMES AND RECOMMENDATIONS OF THE WORKSHOP

	Group 1	**Group 2**	**Group 3**
Standard expressed as a % reduction or a concentration?	Concentration	Concentration	Concentration
Initial Standard	No detectable organisms > 50 μm	For organisms > 100 μm size (zooplankton): < 1 organism /MT* For organisms 100–20 μm size (larval or microzooplankton): < 0.05 org. /Liter (= 50 /MT) For organisms 100–20 μm size (phytoplankton): < 500 orgs./L (= 500,000/MT)	No detectable organisms > 100 μm in size [should go into effect by 2006]
Later Standard	Determine in review process	For organisms > 20 μm in size: < 1 org. /10 MT (= 0.1 /MT) For organisms < 20 μm: [specific concentrations tbd] for target taxa	No detectable. organisms > 50 μm [should go into effect by 2009] No detectable organisms > 25 μm [should go into effect by 2015]

* MT = Metric tonne or m^3